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09/197,499 11/23/98 SHO MAZU R 09/60-52794

EXAMINER

IM22/1907
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ART UNIT SUPERVISOR PAPER NUMBER

6

1754

DATE MAILED: 10/07/99

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS.

This application has been examined Responsive to communication filed on March 31, 1999 This action is made final.

A shortened statutory period for response to this action is set to expire three(3) month(s), _____ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. Notice of References Cited by Examiner, PTO-892. 2. Notice of Draftsman's Patent Drawing Review, PTO-948.
3. Notice of Art Cited by Applicant, PTO-1449. 4. Notice of Informal Patent Application, PTO-152.
5. Information on How to Effect Drawing Changes, PTO-1474. 6. _____

Part II SUMMARY OF ACTION

1. Claims 1, 5-17 are pending in the application.

Of the above, claims 11 - 17 are withdrawn from consideration.

2. Claims _____ have been cancelled.

3. Claims _____ are allowed.

4. Claims 1, 5-10 are rejected.

5. Claims _____ are objected to.

6. Claims _____ are subject to restriction or election requirement.

7. This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.

8. Formal drawings are required in response to this Office action.

9. The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are acceptable; not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).

10. The proposed additional or substitute sheet(s) of drawings, filed on _____, has (have) been approved by the examiner; disapproved by the examiner (see explanation).

11. The proposed drawing correction, filed _____, has been approved; disapproved (see explanation).

12. Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has been received not been received been filed in parent application, serial no. 09/743,081; filed on 11/4/96.

13. Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.

14. Other

EXAMINER'S ACTION

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DETAILED ACTION

Applicant's election with traverse of Group I in Paper No. 4 (filed March 31, 1999) is acknowledged. The traversal is on the ground(s) that examining all claims would cause no undue burden. This is not found persuasive because the search for each group is different than for the others.

The requirement is still deemed proper and is therefore made FINAL.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claims 5-10 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants are requested to point support in the instant specification, by page and line numbers, for "a powder Raney catalyst for a fixed bed" as required in the instant claims 9-10. It should be noted that the lump Raney catalyst for a fixed bed is used for a hydrogenation process, and after such used, the lump Raney catalyst can be reactivated by crushing into powder (note

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page 6, second full paragraph). However, it appears that the instant specification does not disclose that such powder Raney catalyst can be used for fixed bed.

In claim 5, “suitable for forming a fixed bed catalyst” is indefinite because it is unclear what is considered as “suitable”, it is noted that in the paragraph bridging pages 3-4 of the instant specification, it is disclosed that if the particle size of the catalyst is too small, the reaction mixture flows more slowly and the productivity is low, and if the grains are too large, the reaction speed and the productivity of sugar alcohol are reduced. In both of these instances, the too small or too large particle size catalyst, a fixed bed can still be formed.

Claims 1, 5-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, it is unclear what is required by “catalyst obtained by using for the hydrogenation under the hydrogen pressure a lump form Raney catalyst”, is the catalyst obtained from the hydrogenation? It is also unclear what is required by “the third step for classifying and activating said quenched lump alloy as it is or once it is broken, collecting said lump form Raney catalyst, crushing into powder, and reactivating. Is it required that the quenched lump alloy in step (ii) is optionally crushed, then classified, activated, crushed, reactivated?

In claim 5, in the last step, the limitation of “activating said quenched lump alloy or said quenched lump alloy particles to form a Raney catalyst” is required, however, it is unclear if the

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previous steps, i.e. the "breaking" and "classifying" steps are positively required, because if they are, the "quenched lump alloy" would become quenched lump alloy particles and there would be no more "quenched lump alloy" to be activated in the last step.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5, 7 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Schuetz et al (5,536,694).

Schuetz '694 discloses a fixed-bed catalyst consists of powder particles of the catalyst alloy which are bonded by sintering with a powder (i.e. the binder) of the Raney process metal

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itself. It contains no catalytically inactive binder at all (note column 5, lines 21-25). Ni and Al were used (note Table 2, Example 1).

The product as disclosed in Schuetz '694 anticipates the claimed product.

Alternatively, any difference imparted by the product by process limitations would have been obvious to one having ordinary skill in the art at the time the invention was made because where the examiner has found a substantially similar product as in the applied prior art the burden of proof is shifted to the applicant to establish that their product is patentably distinct not the examiner to show that the same process of making, see In re Brown, 173 U.S.P.Q 685, and In re Fessmann, 180 U.S.P.Q. 324.

¹⁴
Claims 5, 7-8, are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuetz

'694.

Schuetz '694 discloses a fixed bed catalyst as stated above. The ratio^x by weight of Raney process metal to leachable alloying component in the catalyst alloy is in the range from 30:70 to 70:30 as is usual with Raney alloys (note column 3, lines 59-63). This range overlaps the claimed range. The ratios by weight of catalyst alloy powder to binder in the range 100:20 to 100:0.5 have proven to be useful (note column 5, lines 51-52). The catalytically active metal is selected from the group consisting of nickel, cobalt, copper, iron and mixture thereof (note claim 3), the leachable alloy component is selected from the group consisting of aluminum, zinc, silicon and mixture thereof (note claim 4). Specifically, Ni and Al is used in Example 1 (note Table 2)

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The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schuetz '694 as applied to claims 5, 7-8¹ above, and further in view of Lepper et al (4,520,211).

Schuetz '694 discloses a fixed bed catalyst with the size of 5.2 x 3 mm (note last two lines of column 7). The disclosure of Schuetz '694, however, should not be limited to just the exemplified size. It would have been obvious to one of ordinary skill in the art to optimize the size of the shaped, activated catalyst of Schuetz '694 in order to obtain the best results.

Lepper '211 teaches that in a process of making polyhydric alcohols (i.e. sugar alcohols) by the hydrogenation of carbohydrates, a "catalyst solid bed" is preferred. The catalyst solid bed is defined as stationary arrangement of the catalyst in the reactor in the manner of a packed bed (note column 2, lines 47-52), thus the catalyst solid bed in Lepper is considered the same as a fixed bed catalyst. Lepper further discloses that the particle size of the catalyst employed in lumpy form may vary widely. On the one hand, the catalyst particles should not be so small that the flow resistance of the catalyst solid bed greatly hinders the through flow of the mixture of hydrogen and aqueous carbohydrate solution and necessitates too high a pressure. On the other hand, the maximum dimensions of the lumpy catalyst are given by the reactor geometry. As a

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rule, the particle size of the catalyst lumps, i.e. the diameter and/or length of the catalyst particles, will be selected so that it is in the range of from about 2 to 10 mm (note column 3, lines 16-32). This range overlaps the claimed range. The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549. It is noted that the in Lepper '211, the catalyst is a ruthenium-containing catalyst, not a Raney catalyst, however, only the physical size of the catalyst (not the composition of the catalyst) has direct impact on the flow resistance, etc., as discussed above, for the hydrogenation process.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to optimize the particle size of the shaped, activated catalyst of Schuetz '694 within the range suggested by Lepper '211 because such range is desired for a fixed bed catalyst in the hydrogenation process.

18-21

Claims 1, 5, 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuetz et al (5,536,694) in view of Raney (1,628,190), optionally further in view of Richter (3,673,116).

Schuetz '694 discloses that activated metal catalysts are known as Raney catalysts in the chemical engineering field, they are used mainly in the powdered form in a large number of reactions for hydrogenating organic compounds. These powdered catalysts are prepared from an alloy of a catalytically active metal and another alloying component which is leachable in alkali.

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The catalytically active metals used are mainly Ni, Co, Cu or Fe. The alloying component which is mainly used is aluminum (note column 1, lines 30-41). Schuetz '694 further teaches that powder catalysts have the disadvantages that they can only be used in batch processes and have to be isolated after the catalytic reaction by time-consuming filtration of the reaction media. Various processes for preparing molded items have therefore been disclosed which lead to activated metal fixed bed catalysts after extraction of the aluminum. Thus, for example, coarse particulate, i.e. only coarsely milled, Raney alloys are available which can be activated by treatment with caustic soda solution (note column 1, lines 51-60). When coarse particulate is desired to be used in fixed bed catalyst, it would have been obvious to one of ordinary skill to remove any particles with undesirable size before activating the Raney alloy.

The difference is Schuetz '694 does not specifically disclose the process of making the Raney alloys even though Schuetz '694 does disclose that such alloys are known in the art.

Raney '190 discloses a method of producing metallic nickel in a catalytic state such as may be used in the hydrogenation of oils, fats, waxes and the like (note page 1, lines 5-7). The process comprises the steps of alloying metallic nickel with metals such as silicon and aluminum in various proportions, and then dissolving the aluminum and silicon from the alloy by means of a solvent which will not attack the nickel, whereupon the nickel remains in a finely divided state (note page 1, lines 8-13). The alloying is carried out by melting the nickel, aluminum and silicon either separately, or together, cooling the melt and pulverizing the solidified alloy.

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Optionally, Richter '116 can be applied to teach in the well known process of making Raney catalyst, "cooling" is quenching, or at least cooling is preferred to be quenching, note in Example 1, "cooled" is used and in Example 2, "quenching" is used. Also, Richter discloses that it was found beneficial to cool rapidly the Raney alloy produced by melting by excluding air, since the fine crystalline texture of the Raney alloy which occurs during the quenching of the melt, is easy to homogenize (note column 2, lines 39-43).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the known Raney process such as the process disclosed in Raney '190 which comprises the steps of melting, cooling or quenching, pulverizing, to produce the Raney alloy in the process of Schuetz '694 and to only coarsely pulverize the alloy in order to use coarse particles in a fixed bed as disclosed in Schuetz '694.

It also would have been obvious to one of ordinary skill in the art at the time of the invention was made to further pulverize the coarse particles to obtain finer particles when powder catalyst is desired. It should be noted that in Schuetz '694, both powder catalyst or coarse catalyst can be used.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schuetz '694 in view of Raney '190, optionally in view of Richter '116 as applied to claims 1, 5, 7-10 above, and further in view of Lepper et al (4,520,211).

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The difference is Schuetz does not disclose the size of the coarse catalyst used for the fixed bed.

Lepper '211 is applied as stated in the above rejection to teach the desired particle size for a fixed bed catalyst used in a hydrogenation process.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to coarsely milled the Raney alloy as disclosed in Schuetz '694 within the range suggested by Lepper '211 because such range is desired for a fixed bed catalyst in the hydrogenation process.

¹⁹
Claims 5-8, are rejected under 35 U.S.C. 103(a) as being unpatentable over Diffenbach et al (3,719,732) in view of Lepper '211.

Diffenbach '732 discloses a process for producing active catalyst particles comprising:
providing a melt consisting essentially of an alloy selected from the group consisting of Al-Ni, Al-Co, Al-Fe and Al-Cu;
forming said melt into discrete droplets;
simultaneously shaping and cooling said droplets by dropping said droplets into a vaporizable liquid (i.e. quenching);
leaching at least a part of said aluminum content from said shaped particles so that the shaped active catalyst contains at least 10% of the non-aluminum component (note claim 1).

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The Ni-Al composition varies from 40-60 Ni-Al to 10-90 Ni-Al (note Table in column 6). This range overlaps the claimed range, see In re Malagari as stated above. The particles having a diameter of from about 1/4 to 1/2 inch (= 6.35-12.7 mm) (note column 5, lines 69-70).

The difference is Diffenbach '732 does not disclose the step of pulverizing the shaped particles before the leaching step.

Lepper '211 is applied as stated above to teach that the desired particle size for a fixed bed catalyst is between 2-10 mm.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to grind the particles produced in the process of Diffenbach '732 to obtain a slightly smaller (i.e. coarsely grind) particle size as suggested by Lepper '211 because the smaller size is more desired for the fixed bed catalyst.

14-21

Claims 1, 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diffenbach '732 in view of Lepper '211 as applied to claims 5-8 above, and further in view of Schuetz '694.

The difference not yet discussed is Diffenbach '732 does not disclose the second pulverizing step.

Schuetz '694 is applied as stated above to teach that both fixed bed catalyst, i.e. coarse catalyst and powder catalyst, i.e. finer catalyst are desired in the art.

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It would have been obvious to one of ordinary skill in the art at the time of the invention was made to further pulverizing the Raney catalyst of Diffenbach '732 when the powder catalyst is desired as suggested by Schuetz '694.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication should be directed to Ngoc-Yen Nguyen at telephone number (703) 308-2536.

The fax phone number for this Group is (703) 305-3599 (for OFFICIAL After Final amendment only) or (703) 305-5408 (for all other OFFICIAL faxes). UNOFFICIAL fax can be sent to (703) 305-6078.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

N. M. Nguyen
October 1, 1999

Ngoc-yen Nguyen
N. M. Nguyen
Primary Examiner
Art Unit 1754